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Abstract

OPERATION OF ATOMIC PLANT ON THE ICEBREAKER LENIN

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The paper summarizes the experience gained in the course of operation of the atomic plant on the icebreaker LENIN during 1959 to 1963 in the Arctic region under various conditions: when taking caravans of ships through ice (the total number of the ships is about 300), when sailing at high latitudes to bring the personnel and equipment of the drifting station "North Pole 10" to their base, when sailing in clear waters at roll angles as great as 30° . Under all these conditions the atomic plant provided an uninterrupted supply of energy for the icebreaker with the reactors operating at various power levels including the maximum power of 90 MW.

The paper presents data on the changes in the neutron-physical and thermotechnical characteristics of the reactor cores throughout the company which somewhat exceeded the rated duration. Such data cannot be obtained from the experiments with the fuel elements in the loops of the research reactors. They become available only as a result of the complete burn-up of the core with the specific positions of the control components and at specific distortions of the neutron fields.

The operational experience has shown that the design of the atomic plant and its arrangement on the icebreaker proved to be successful and equipment reserves quite sufficient. Recommendations are made for the modernization of some components and systems on the basis of the four-year experience. It has been shown that the required water conditions in the primary and secondary circuits can be maintained with the aid of simple mechanical and ion-exchange filters

provided appropriate steps are taken to minimize the possibility of sea water leakage into the equipment and in the pipeline joints. No overirradiation of the personnel servicing the atomic plant took place during operation. The plant proved to be so reliable that a daily inspection of the periodically serviced rooms was quite sufficient.

The radiation safety was enhanced by the concentration of the atomic plant in a special isolated compartment fitted with an independent ventilation system, the equipment for the removal and temporary storage of the active water, temporary solid waste storages. Radiation safety measures are described for certain disturbances in the normal operation of the plant.

The paper also describes the maintenance of the icebreaker at the base.

As a whole, the operational experience has shown that the use of atomic plants on icebreakers has highly promising prospects.